

Math 0362

Practice Test 2

1. Find the domain of each rational function

$$f(x) = \frac{3x-2}{9-x}$$

$$9-x=0$$

$$\begin{array}{r} +x \\ +x \end{array}$$

$$9 \neq x$$

$$(-\infty, 9) \cup (9, \infty)$$

2.

$$f(x) = \frac{x+10}{x^2-16}$$

$$x^2-16=0$$

$$\begin{array}{r} +16 \\ +16 \end{array}$$

$$\sqrt{x^2} = \sqrt{16}$$

$$x = 4, -4$$

$$(-\infty, -4) \cup (-4, 4) \cup (4, \infty)$$

3. Simplify

$$\frac{9-x^2}{x-3} = \frac{(3-x)(3+x)}{\cancel{x-3}}$$

$$= \boxed{-1(3+x)}$$

4.

$$\frac{x^3+4x^2}{x^2+2x-8} = \frac{x^2(x+4)}{(x+4)(x-2)}$$

$$= \boxed{\frac{x^2}{x-2}}$$

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$$\begin{array}{c} 4 \quad 2 \\ \swarrow \quad \searrow \end{array}$$

$$= \boxed{\frac{x^2}{x-2}}$$

Find product and simplify

5.

$$\frac{9x}{y^2} \cdot \frac{5y}{4x} = \boxed{\frac{45}{4y}}$$

6. $\frac{(x-3)(x+3)}{x^2-9} \cdot \frac{x+1}{x}$

$$\frac{x^2-9}{x^2-2x-3} \cdot \frac{x+1}{x}$$

$$\rightarrow \frac{\cancel{(x-3)}\cancel{(x+3)}}{\cancel{(x-3)}\cancel{(x+1)}} \cdot \frac{\cancel{x+1}}{x}$$

$$(x-3)(x+1)$$

$$= \boxed{\frac{x+3}{x}}$$

7.

$$\frac{x^2+11x+24}{x-9} \div \frac{x^2+2x-3}{x-9}$$

$$\frac{\cancel{(x+8)}\cancel{(x+3)}}{x^2+11x+24}$$

$$\cancel{x-9}$$

$$\cancel{x-9}$$

$$x^2+2x-3$$

$$\cancel{(x+3)}\cancel{(x-1)}$$

$$= \boxed{\frac{x+8}{x-1}}$$

Add or subtract

8.

$$\frac{x+5}{x-8} + \frac{4x+6}{x-8} = \boxed{\frac{5x+11}{x-8}}$$

9.

$$\frac{11x+14}{x^2-10x+24} - \frac{10x+18}{x^2-10x+24} = \frac{\cancel{x-4}}{\cancel{x^2-10x+24}} = \boxed{\frac{1}{x-6}}$$

$(\cancel{x-4})(x-6)$

10.

$$\frac{7x+8}{x^2-12x+27} - \frac{6x+11}{x^2-12x+27} = \frac{\cancel{x-3}}{\cancel{x^2-12x+27}} = \boxed{\frac{1}{x-9}}$$

$(\cancel{x-3})(x-9)$

Perform indicated operations

$$11. \frac{(5x)1}{(5x)x} + \frac{2}{5x^2}$$

$$\frac{5x}{5x^2} + \frac{2}{5x^2} = \boxed{\frac{5x+2}{5x^2}}$$

1) "Fair" make sure everything
in bottom is same

12.

$$\frac{3}{x} - \frac{4(\cancel{x})}{1(\cancel{x})} = \frac{3}{x} - \frac{4x}{x} = \boxed{\frac{3-4x}{x}}$$

13.

$$\frac{7}{x^2+5x-6} - \frac{3}{x-1} \frac{(x+6)}{(x+6)}$$

$(x+6)(x-1)$

1) Factor
2) Fair
3) Big fraction

$$\frac{7 - 3(x+6)}{(x+6)(x-1)} = \frac{7-3x-18}{(x+6)(x-1)} = \boxed{\frac{-3x-11}{(x+6)(x-1)}}$$

Solve the following equations

14.

$$\frac{w-8}{3} \neq \frac{w}{7}$$

$$7(w-8) = 3w$$

$$\begin{array}{r} 7w - 56 = 3w \\ -7w \quad -7w \\ \hline \end{array}$$

$$\begin{array}{r} -56 = -4w \\ -4 \quad -4 \\ \hline \end{array}$$

$$\boxed{14 = w}$$

15.

$$\frac{6x}{x+2} - \frac{6}{x-2} = \frac{x-23}{x-2} \quad \text{get common denominator}$$

only look at Top
Lots of Foil

$$6x(x-2) - 6(x+2)(x-2) = (x-23)(x+2)$$

$$6x^2 - 12x - 6(x^2 - 2x + 2 - 4) = x^2 + 2x - 23x - 46$$

$$\begin{array}{r} 6x^2 - 12x - 6x^2 + 24 = x^2 - 21x - 46 \\ +12x \quad -24 \quad +12x - 24 \\ \hline \end{array}$$

$$0 = x^2 - 9x - 70$$

$$(x-14)(x+5)$$

$$\begin{array}{r} x-14=0 \quad x+5=0 \\ +14 \quad +4 \quad -5 \quad -5 \\ \hline \boxed{x=14} \quad \boxed{x=-5} \end{array}$$

16.

$$\frac{a}{a-2} = \frac{-6}{a-5}$$

$$a(a-5) = -6(a-2)$$

$$a^2 - 5a = -6a + 12$$

$$+6a - 12 \quad +6a - 12$$

$$a^2 + a - 12 = 0$$

$$(a+4)(a-3)$$

$$a+4=0$$

$$\underline{-4 \quad -4}$$

$$a = -4$$

$$a-3=0$$

$$\underline{+3 \quad +3}$$

$$a = 3$$

17.

$$\frac{(x-2)}{(x-2)} \cdot \frac{x+1}{x+5} = \frac{x^2-27x}{(x+5)(x-2)} - \frac{x-5}{x-2} \cdot \frac{(x+5)}{(x+5)}$$

Work Top

$$(x-2)(x+1) = x^2 - 27x - (x-5)(x+5)$$

$$x^2 + x - 2x - 2 = x^2 - 27x - (x^2 - 5x + 5x - 25)$$

$$x^2 - x - 2 = x^2 - 27x - x^2 + 25$$

$$\underline{+27x \quad -25 \quad +27x \quad -25}$$

$$x^2 + 26x - 27 \rightarrow (x+27)(x-1)$$

$$x = -27 \quad x = 1$$

18.

One third equals the quotient of a number and 24. Find number

$$\frac{1}{3} = \frac{x}{24}$$

$$\frac{3x}{3} = \frac{24}{3}$$

$$x = 8 \quad \checkmark$$

19. It takes mom 3 hours to weed flowerbed. Her daughter can weed same area in 2 hours. If the two work together, how long will it take to complete job?

$$\frac{\text{Multiply}}{\text{Add}} = \frac{3 \times 2}{3 + 2} = \frac{6}{5}$$

20. A jogger jogs 14 miles to park. To cool down, he jogs 10 miles but reduces ~~some~~ speed by 2 miles per hour. Each portion takes same amount of time. Find joggers speed for first portion and cool down.

time = distance \times speed
 time = $\frac{d.s}{\text{speed}}$

Going to park cool down

$$14x = 10(x-2)$$

$$14x = 10x - 20$$

$$\frac{14}{x} = \frac{10}{x-2}$$

$$\begin{aligned} \text{jog} &= 7 \text{ mph} \\ \text{cool} &= 5 \text{ mph} \end{aligned}$$

$$\begin{aligned} 10x &= 14(x-2) \\ 10x &= 14x - 28 \\ -14x - 14x & \\ -4x &= -28 \\ \frac{-4x}{-4} &= \frac{-28}{-4} \end{aligned}$$

$$x = 7$$

Simplify the complex fractions

21.

$$\frac{\frac{x}{x} \cdot \frac{3 - \frac{7}{x}}{1}}{\frac{8x}{8x} + \frac{7}{8x}} = \frac{\frac{3x-7}{x}}{\frac{8x^2+7}{8x}} = \frac{3x-7}{x} \div \frac{8x^2+7}{8x}$$

$$\frac{3x-7}{x} \cdot \frac{8x}{8x^2+7} = \boxed{\frac{24x-56}{8x^2+7}}$$

22.

$$\frac{\left(\frac{x}{x}\right) \frac{7}{x} + \frac{2}{x^2}}{\frac{y}{x^2}} = \frac{\frac{7x^2+2}{x^2}}{\frac{y}{x^2}}$$

$$\frac{7x^2+2}{\cancel{x^2}} \cdot \frac{\cancel{x^2}}{y} = \boxed{\frac{7x^2+2}{y}}$$